

AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (currently amended) A method for routing data packets in a packet-switched network, comprising:

receiving a data packet at a network routing device residing in the network, the data packet being formulated in accordance with the Internet Protocol (IP) to have a packet header including a destination IP address field, a source IP address field, and an options field, and having at least one private IP address embedded in the options field of the packet header;

extracting the at least one private IP address directly from the options field; [[and]]

directly formatting the destination IP address field of the packet header with the at least one private IP address prior to forwarding the data packet; and

repeating the steps of receiving, extracting, and directly formatting at a second network routing device.

2. (original) The method of Claim 1 wherein the step of receiving a data packet further comprises receiving the data packet at a public-side interface of the network routing device.

3. (original) The method of Claim 1 further comprises forwarding the data packet through a private-side interface of the network routing device.

4. (original) The method of Claim 1 further comprises defining the options field of the packet header to include an embedded address indicator which indicates the presence of the at least one private IP address in the options field.

5. (original) The method of Claim 1 further comprises formatting the destination IP address field when an IP address residing in the destination IP address of the packet header matches a public-side interface IP address for the network routing device.

6. (previously presented) The method of Claim 1 further comprises reformatting the options field to remove the at least one private IP address.

7. (original) The method of Claim 1 wherein the data packet includes two or more private IP addresses appended to each other in a predefined order within the options field of the packet header.

8. (previously presented) The method of Claim 1 further comprises repeating the process of extracting and formatting at each network routing device interposed between a public network and a destination network device, wherein, to an extent that multiple routers are interposed between a public network and a destination

host in a private network, another private IP address is directly extracted from the options field and directly inserted into the destination IP address field of the packet header at each intermediate routing device, thus ensuring that the data packet is routed in a peer-to-peer manner from a source host to a destination host.

9. (currently amended) A network routing device positioned between a private network and a public network in a packet-switched network system, the network routing device adapted to receive data packets at a public-side interface, the data packets being formulated in accordance with Internet Protocol (IP) to have a packet header including a destination IP address field, a source IP address field, and an options field, and selectively having at least ~~[[one]]~~ two private IP destination addresses address embedded in the options field of the packet header, the network routing device being operable to extract directly one of the at least ~~[[one]]~~ two private IP destination addresses address from the options field and format directly the destination IP address field of the packet header with the one of the at least ~~[[one]]~~ two private IP addresses address.

10. (previously presented) The network routing device of Claim 9 being further operable to format the destination IP address field when an IP address residing in the destination IP address field of the packet header matches a public-side interface IP address for the network routing device.

11. (previously presented) The network routing device of Claim 9 being further operable to reformat the options field after extracting the at least one private IP address from the options field.

12. (original) The network routing device of Claim 9 wherein the data packet includes two or more private IP addresses appended to each other in a predefined order within the options field of the packet header.

13. (currently amended) A method for routing data packets in a packet-switched network, comprising:

receiving a data packet transmitted by an originating network device at a network routing device residing in the network, the data packet being formulated in accordance with the Internet Protocol (IP) to have a packet header including a destination IP address field, a source IP address field, and an options field, and having an original source private IP address in the source IP address field of the packet header and a destination IP address in the destination IP address field of the packet header;

directly formatting the options field of the packet header with the original source private IP address; and

directly formatting the source IP address field of the packet header with an IP address for the network routing device prior to forwarding the data packet;

repeating the steps of receiving, directly formatting the options field, and directly formatting the source IP address field at a second network routing device.

14. (original) The method of Claim 13 wherein the step of receiving a data packet further comprises receiving the data packet at a private-side interface of the network routing device.

15. (original) The method of Claim 13 further comprises forwarding the data packet through a public-side interface of the network routing device.

16. (original) The method of Claim 13 further comprises receiving the data packet at a network device having an IP address that matches the destination IP address embedded in the destination IP address field; and extracting the original source private IP address from the options field and the IP address for the network routing device from the source IP address field of the packet header for subsequent communications with the originating network device.

17. (original) The method of Claim 13 further comprises:

receiving the data packet at a another network routing device having a private-side interface IP address;

appending the IP address for the network routing device to the original source private IP address in the options field of the packet header; and

formatting the source IP address field of the packet header with a public interface IP address for the another network routing device prior to forwarding the data packet.

18. (original) The method of Claim 17 further comprises receiving the data packet at a destination network device having an IP address that matches the destination IP address embedded in the destination IP address field; and extracting the original source private IP address and the IP address for the network routing device from the options field and the IP address for the another network routing device from the source IP address field of the packet header for subsequent communications with the originating network device.

19. (currently amended) A network routing device positioned between a private network and a public network in a packet-switched network system, the network routing device adapted to receive data packets at a private-side interface, the data packets being formulated in accordance with Internet Protocol (IP) to have a packet header including a destination address field, a source address field, and an options field including a stored source IP address, and having an original source private IP address in the source destination IP address field of the packet header, the network routing device being operable to format the options field of the packet header ~~[[with]]~~ by adding the original source private IP address to the stored source IP address and format the source IP address field of the packet header with a public interface IP address for the network routing device prior to forwarding the data packet.

20. (currently amended) A packet header of a data packet formulated in accordance with the Internet Protocol (IP) to have a packet header including a destination IP address field, a source IP address field, and an options field, the data

packet embodied in a carrier wave for processing by a computer, comprising [[an]] IP addresses for an originating network device and at least one intermediate routing device embedded in the options field of the packet header, and an IP address for an intermediate routing device embedded in the source IP address field of the packet header.

21. (original) The packet header of Claim 20 further comprises an embedded address indicator residing in the options field of the packet header, the embedded address indicator indicative of the presence of the IP address in the options field.

22. (currently amended) A packet header of a data packet formulated in accordance with the Internet Protocol (IP) to have a packet header including a destination IP address field, a source IP address field, and an options field, the data packet embodied in a carrier wave for processing by a computer, comprising [[an]] IP addresses for a destination network device and at least one intermediate routing device embedded in the options field of the packet header, and an IP address for an intermediate routing device embedded in the destination IP address field of the packet header.

23. (original) The packet header of Claim 22 further comprises an embedded address indicator residing in the options field of the packet header, the embedded address indicator indicative of the presence of the IP address in the options field.

24. (previously presented) A traversable addressing scheme for packets formulated in accordance with the Internet Protocol (IP) to have a packet header including a destination IP address field, a source IP address field, and an options field, that uniquely identifies a network device residing in a private network and having at least one network routing device interposed between the network device and a public network, comprising concatenating an IP address for the network device in a predefined order with a public side interface IP address for the at least one network routing device to form a traversable network address, wherein said traversable network address partially resides in the options field of the packet header, and said source and destination IP address fields of the packet header are directly formatted with existing IP addresses that hosts have been assigned.

25. (cancelled)

26. (original) The traversable addressing scheme of Claim 24 wherein the public side interface IP address for the at least one network routing device is appended to the IP address for a source network device.

27. (original) The traversable addressing scheme of Claim 24 wherein the public side interface IP address for the at least one network routing device is prepended to the IP address for a destination network device.

28. (original) The traversable addressing scheme of Claim 24 further comprises registering the traversable network address of the network device with a domain name server.

29. (original) The traversable addressing scheme of Claim 24 further comprises determining the traversable network address of the network device by accessing the domain name server.

30. (original) The method of Claim 13 further comprises repeating the process at each network routing device interposed between the originating network device and a public network.

31. (currently amended) A method comprising:

- receiving a packet at a first interface, said packet having a header including a destination address field, a source address field, and an options field;
- selectively reading a first destination address from a plurality of destination addresses within said options field;
- selectively placing said first destination address into said destination address field; and
- forwarding said packet out a second interface.

32. (previously presented) The method of Claim 31 further comprising checking an indicator within said options field, wherein said selectively reading and said selectively placing are performed when said indicator is in a first state.

33. (previously presented) The method of Claim 32 further comprising setting said indicator to a second state when no destination addresses remain in said options field.

34. (previously presented) The method of Claim 32 wherein said indicator is in said first state when said indicator is non-zero.

35. (currently amended) The method of Claim 32 further comprising ~~decrementing~~ updating said indicator, wherein said indicator indicates how many destination addresses remain in said options field.

36. (previously presented) The method of Claim 31 further comprising removing said first destination address from said options field before performing said forwarding.

37. (currently amended) The method of Claim 36 wherein said header also includes a header length field, and further comprising ~~reducing~~ updating a number stored in said header length field to reflect an absence of said first destination address.

38. (cancelled)

39. (previously presented) The method of Claim 31 wherein said first interface is a public interface and said second interface is a private interface.

40. (previously presented) The method of Claim 31 wherein said header is an Internet Protocol header.

41. (currently amended) A method for a routing device, comprising:
receiving a packet at a first interface, said packet having a header including a destination address field, a source address field, and an options field;
reading a first source address from said source address field;
~~incorporating~~ inserting said first source address into said options field;
placing a public address of the routing device into said source address field; and
forwarding said packet out a second interface.

42. (cancelled)

43. (previously presented) The method of Claim 42 wherein said header also includes a header length field, and further comprising ~~increasing~~ updating a number stored in said header length field to reflect a presence of said first source address.

44. (cancelled)

45. (currently amended) The method of Claim 41 further comprising ~~incrementing~~ updating an indicator in said options field, wherein said indicator indicates how many source addresses are stored in said options field.

46. (previously presented) The method of Claim 41 wherein said first interface is a private interface and said second interface is a public interface.

47. (previously presented) The method of Claim 41 wherein said header is an Internet Protocol header.

48. (new) A method for traversing multiple intermediate routing devices between a host and a public network, comprising:

receiving a packet having a packet header at a first one of the intermediate routing devices;

storing contents of a source address field of the packet header into an options field of the packet header;

replacing contents of the source address field with an address of the first one of the intermediate routing devices; and

repeating the receiving, storing, and replacing for each one of the intermediate routing devices.

49. (new) A method for traversing multiple intermediate routing devices between a public network and a host, comprising:

receiving a packet having a packet header at a first one of the intermediate routing devices;

replacing contents of a destination address field of the packet with a destination address from the options field of the packet header; and

repeating the receiving and replacing for each one of the intermediate routing devices.